



former GM Linden MSD002 126 690

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August 4, 2011

Mr. Gary Greulich, Section Chief
New Jersey Department of Environmental Protection
Site Remediation - North Field Office
7 Ridgedale Ave.
Cedar Knolls, NJ 07927

RE: Scope of Work for Monitoring Well Installation Activities at the Former Quixx Cogeneration Plant, 301 Pleasant Street, Linden, NJ; DUK059.701.0050.

Dear Mr. Greulich:

Hull & Associates, Inc. (Hull), on behalf of Linden Development LLC (Linden Development), are herein providing a scope of work for monitoring well installation activities supporting the overall evaluation of disputed groundwater impacts between the Former General Motors Corporation (GM) Linden Assembly Plant and the neighboring Merck & Co., Inc. (Merck) pharmaceutical complex. The scope of work has been developed pursuant to your request for installation of a monitoring well cluster at the Former Quixx Cogeneration Plant, located at 301 Pleasant Street in Linden, NJ (Cogen Site). The Cogen Site is located adjacent to the Former GM Linden Assembly Plant. Linden Development purchased the Former GM Linden Assembly Plant from GM in December 2007 and is currently pursuing remediation and redevelopment of that property under New Jersey's Industrial Site Recovery Act (ISRA). Linden Development purchased the Cogen Site from GM as part of a separate transaction in December 2008 and is pursuing redevelopment opportunities for that property as part of the overall redevelopment of the former assembly plant acreage.

Background

In March 2008, the New Jersey Department of Environmental Protection (NJDEP) Case Team assigned to the Former GM Linden Assembly Plant requested installation of three monitoring wells on the Cogen Site. Specifically, the request included a three-well monitoring cluster be installed near the center of the former Cogen Site to evaluate groundwater quality and conditions for three distinct, yet interrelated, hydrogeologic zones. The three hydrogeologic zones include: Deep overburden, Weathered bedrock, and Bedrock.

NJDEP's March 2008 request also included installation of several additional soil borings at the Cogen Site to collect soil samples for laboratory analysis. At the time of NJDEP's request, the Cogen Site was owned by GM and negotiations related to potentially selling the property to Linden Development were ongoing. The soil borings requested by NJDEP were subsequently installed as part of soil sampling activities conducted in June 2008 to support Linden Development's pre-acquisition due diligence activities at the Cogen Site. The results of the soil sampling were reported to NJDEP in a report dated September 25, 2008 and suggested that there are no sources to groundwater contamination present on the Cogen Site. In October 2008, NJDEP issued an approval of the September 25, 2008 report and concurred that no sources have been identified at the Cogen Site that would have contributed to the documented groundwater contamination in the area. Furthermore, a separate NJDEP case team that was



assigned to an ISRA case associated with the Cogen Site from a property transfer prior to 2008, issued a No Further Action Letter (NFA) for the Cogen Site in September 2008.

Concurrent with the 2008 soil sampling implementation at the Cogen Site, the NJDEP Case Team for the Former GM Assembly Plant and Linden Development agreed that installation of the three wells requested for the Cogen Site would not be required until such time that additional wells that had previously been requested for installation by Merck on their property were completed.

Based on recent discussions with the NJDEP Case Team, Merck has since installed wells requested to date on their property, and the Cogen Site wells are to be installed to provide additional delineation points for the previously outlined groundwater plumes within the disputed area.

Purpose

Pursuant to NJDEP's request, a three-well cluster will be installed at a location approximately equidistant between the existing MW-47 and MW-43 well clusters, as shown on Figure 1. The well cluster will include MW-97D (deep overburden), MW-97W (weathered bedrock) and MW-97B (bedrock flow zone 2). The purpose of the MW-97 well cluster is to help determine if there is any connection from the most contaminated groundwater found at the MW-47 well cluster, downdip to the north-northwest toward the MW-43 well cluster, and further define the VOC concentration trends outlined during previous investigations.

It is Hull and Linden Development's understanding that sampling results obtained from the newly-installed wells will support NJDEP's Case Team in finalizing a position related to the ongoing groundwater dispute between the Former GM Assembly Plant and neighboring Merck complex. Further, it is our understanding that if sampling results are obtained from the newly-installed wells that are consistent with the VOC concentration trends outlined in the April 2009 report entitled *Supplemental Groundwater Investigation of the Southwest Portion of the Linden Development LLC Site (Former GM Linden Assembly Plant)*, the NJDEP Case Team will prepare a technical decision document supporting a determination that the disputed groundwater contamination did not originate from the Former GM Linden Assembly Plant or Cogen Site.

Scope of Work

Summary of Hydrogeologic Zones to Be Monitored

The hydrogeologic zones underlying the Former GM Linden Assembly Plant were extensively characterized during past environmental assessment activities. The deep overburden zone includes unconsolidated natural material (glacial till) consisting of sandy to silty to clayey till commonly containing 5 to 20 percent pebbles, cobbles and boulders consisting of gneiss, sandstone, basalts and granite. The till deposits contain a few thin lenses of stratified gravel, sand and silt, but is typically a reddish-brown silt.

The weathered bedrock zone is described as a highly to extremely fractured, medium hard, highly weathered, red-brown shale with massive bedding and horizontal and vertical fractures throughout. The weathered bedrock is generally encountered at an average depth of 25 feet below ground surface and is typically 20 feet thick.

The bedrock zone consists of the red-brown, fine grained siltstone of the Passaic Formation. Competent bedrock is defined as having a rock quality designation (RQD) of 30 % or greater. There is an angular unconformity between the unconsolidated surface material and the bedrock. Published sources report the bedrock has a strike of N53°E and a dip of 11° to the northwest. The Passaic Formation bedrock beneath the site has been subdivided into four bedrock flow zones based on the correlation of bedding plane fractures using stratigraphic interpretation, packer pressure testing and aquifer response measurements. The bedrock flow zone No 2 (BFZ#2) is the horizon of interest at the Cogen Site.

Boring Methods

Installation of the additional Cogen Site wells will be conducted consistent with the methods employed during previous investigations at the Former GM Linden Assembly property. These methods have been previously discussed and approved by NJDEP during the RCRA Facility Investigation (RFI) iterations at that property and several follow-up investigations as part of the disputed groundwater evaluation.

Because the three proposed monitoring wells will encounter different conditions, a variety of drilling methods will be used to advance the borings. A New Jersey licensed driller will conduct all drilling and well installation activities.

Prior to drilling, all three proposed well boring locations will be cleared to a depth of ten feet using an air knife for sub-surface utility clearance.

The borings will be advanced through the unconsolidated material using hollow stem augers (HSAs). The wells intended for the deep overburden and weathered bedrock will utilize 6.25-inch internal diameter (ID) augers, while the bedrock well will require 10.25-inch ID augers. Continuous split spoon samples will be collected ahead of the augers and standard penetration test data will be recorded. Split spoon samples will be logged by a geologist and screened for volatile organic compounds (VOCs) using a photo-ionization detector (PID). Soil samples from the well cluster location were collected to satisfy NJDEP's request during the 2008 soil sampling activities discussed previously. Additional soil samples will not be collected for laboratory analysis unless new conditions or elevated PID readings are observed.

The unconsolidated material from only one boring of the nested trio of wells has to be described in detail unless different, unusual conditions are encountered. Split spoon refusal (50 blows with out advancing beyond six inches) will delineate the maximum total depth (TD) for the deep overburden well. The estimated TD for MW-97D is 32 feet bgs, but the actual TD may be less depending on the stratigraphy encountered.

The weathered bedrock well will be continued beyond split spoon refusal by drilling out through the hollow stem augers utilizing a six-inch diameter air rotary coring bit. The geologist will describe the recovered core and the rock quality designation (RQD) will be determined and recorded. The coring operations will continue advancing five feet at a time until two consecutive cores demonstrate a RQD greater than 30%. The estimated maximum TD for MW-97W is 55 feet bgs.

The bedrock well requires the larger diameter augers because a nominal 10-inch tri-cone, air rotary bit will be advanced through the augers to a depth approximately five feet deeper than the TD of the boring used for the weathered bedrock well. An estimated 60 feet of 8.625 steel pipe

(8-inch ID) will be hung in the open borehole, approximately 2-3 feet of the bottom and a bucket of bentonite pellets will be placed at the bottom of the boring and allowed to hydrate. The steel pipe will be pushed into the bentonite sealing the bottom and the HSAs will be removed. Cement/bentonite grout will be tremied into the annulus surrounding the steel pipe in stages to minimize the potential for hydrostatic head trying to force cement into the steel pipe. Once the cement/bentonite grout is in place it will be allowed to cure for 12 hours before resuming drilling operations.

Drilling will continue utilizing a six-inch diameter air rotary coring bit. The geologist will describe the recovered core and the rock quality designation (RQD) will be determined and recorded. The coring operations will continue advancing five feet at a time until the estimated TD for MW-97B of 150 feet bgs is reached.

Logging and Packer Testing Bedrock Well

To aid identification of BFZ#2, the open boring will be logged using wireline methods. These methods may include natural gamma ray, oriented caliper, fluid temperature, fluid conductivity, optical televiewer and heat pulse flowmeter within the open borehole of MW-97B. In addition, straddle packer tests will be conducted to identify BFZ#2 which displays one to two orders of magnitude greater hydraulic conductivity than the surrounding bedrock. Previous packer test studies conducted in the immediate vicinity have indicated that intact portions of the competent bedrock have a hydraulic conductivity on the order of 10^{-6} centimeter per second (cm/sec), while BFZ#2 has a hydraulic conductivity of 10^{-4} to 10^{-5} cm/sec.

The driller will provide inflatable packers spaced to allow the investigation of a ten-foot interval. Multiple packer tests will be conducted on the open borehole to identify BFZ#2. If need be, the boring for MW-97B can be advanced to deeper depths.

Monitoring Well Installation

Following completion of applicable borings, monitoring wells will be constructed of 4-inch ID, schedule 40, polyvinylchloride (PVC), threaded, flush-jointed, 0.01-inch factory slotted screen and riser. The deep overburden well will likely use 5 to 10 feet of screen, the weathered bedrock well will likely use 10 feet of screen and the bedrock well will likely use 20 to 25 feet of screen, depending upon conditions encountered. The annulus around the screen and extending a minimum of two feet above the top of the screen will be backfilled with clean quartz sand. A minimum of two feet of bentonite pellets will be placed above the sand and hydrated with potable water.

The deep overburden and weathered bedrock monitoring wells will be installed through the augers, and the augers gradually extracted as the sand and bentonite are placed. Cement/bentonite grout will be tremied into place to fill the remainder of the annulus and flush-mount protective covers will be installed. The cement/bentonite grout backfill for the bedrock well will be installed in two to three stages, reducing the hydrostatic head in the PVC and reducing the chance for the well to collapse. The NJ licensed driller will submit wells record to the NJDEP upon completion.

Monitoring Well Development

Once installed the wells will be developed by pumping a minimum of ten well volumes of water. pH, conductivity and temperature will be measured during the last three well volumes and the

well will be considered developed when the readings from the last three well volumes are all within $\pm 10\%$ and the water becomes clear.

Slug Testing

Slug tests will be conducted on the three new wells to evaluate the hydraulic conductivity of the water bearing formation. Rising head slug tests will be conducted in the three monitoring wells after they have been developed. A pressure transducer will be used to record the change in hydrostatic head following the removal of a known volume of water. The data will be evaluated using Aqtesolv© aquifer test software. Well gauging will be performed to measure groundwater elevations and evaluate fluctuations in hydraulic gradient.

Surveying

A NJ licensed land surveyor will be used to determine ground surface, top of casing and lateral location of each of the three new monitoring wells. The NJDEP Form B (well location certification) will be submitted to the state with the well record.

General Information

New Jersey-One-Call will be contacted at least 4 days but no greater than ten days prior to initiation of field activities to clear any buried utilities.

All soil cuttings, produced water, development water and decontamination water will be contained and placed into roll off boxes or 55-gallon drums for off-Site disposal.

The drilling rig and all down hole tools; augers, drill pipe, split spoons, etc., will be decontaminated using a high pressure washer upon arrival at the site and between each boring.

Groundwater Sampling

Groundwater samples will be obtained from the new monitoring wells and from other existing nested wells to provide updated groundwater quality data within the target assessment area. Wells to be included are summarized below.

MW-31S	MW-35D	MW-36D	MW-43S	MW-46D
MW-31D	MW-35W	MW-36W	MW-43D	MW-46W
MW-31W			MW-43W	
			MW-43B	
MW-47S	MW-49S	MW-66D	MW-90S	MW-91S
MW-47D	MW-49D	MW-66W	MW-90D	MW-91D
MW-47W	MW-49W	MW-66B	MW-90W	MW-91W
MW-47B	MW-49B		MW-90B	MW-91B
MW-92S	MW-93S	MW-94W	MW-95D	MW-96S
MW-92D	MW-93D	MW-94WS	MW-95W	MW-96D
MW-92W	MW-93W	MW-94B2		MW-96W
MW-97D				
MW-97W				
MW-97B				

Each well will be sampled using down-hole submersible pumps and low-flow methods consistent with the site assessment activities to date. Field crews will also collect appropriate quality assurance/quality control (QA/QC) samples including field blanks and duplicates. Laboratory-prepared trip blanks will accompany samples intended for analysis of VOCs.

Groundwater samples and associated QA/QC samples will be submitted to Test America Laboratories in Edison, NJ for analysis. The samples will be analyzed for VOCs using USEPA Method 8260, semi-volatile organic compounds (SVOCs) using USEPA Method 8270, and metals using USEPA Methods 6010 and 7470.

The need for, and scope of, additional groundwater sampling events will be determined through consultation with the NJDEP Case Team following review of the results from the sampling event discussed above.

Reporting

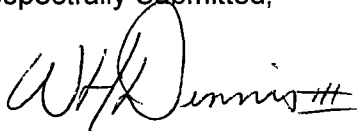
Hull and Linden Development will prepare a letter report detailing the well installation activities, well logging, packer testing and slug testing results, along with a discussion on updated groundwater flow and groundwater quality observations. The report will include tables presenting the gauging data, groundwater analytical results, and appendices including copies of the boring logs/well installation details, well records, and survey form Bs, packer test results, slug test results, and laboratory reports.

Schedule

Linden Development is currently evaluating a number of redevelopment opportunities for the Former GM plant, and the disputed groundwater issue is a significant factor that influences future redevelopment. As such, Hull and Linden Development would like to initiate this scope of work so that all activities can be completed during late-summer and fall of 2011. We would be happy to meet in person to discuss this scope of work and hope that we can proceed with the proposed activities in the immediate future.

We appreciate your assistance to date and look forward to ongoing cooperation in pursuing first-class redevelopment projects at the property.

Respectfully Submitted,



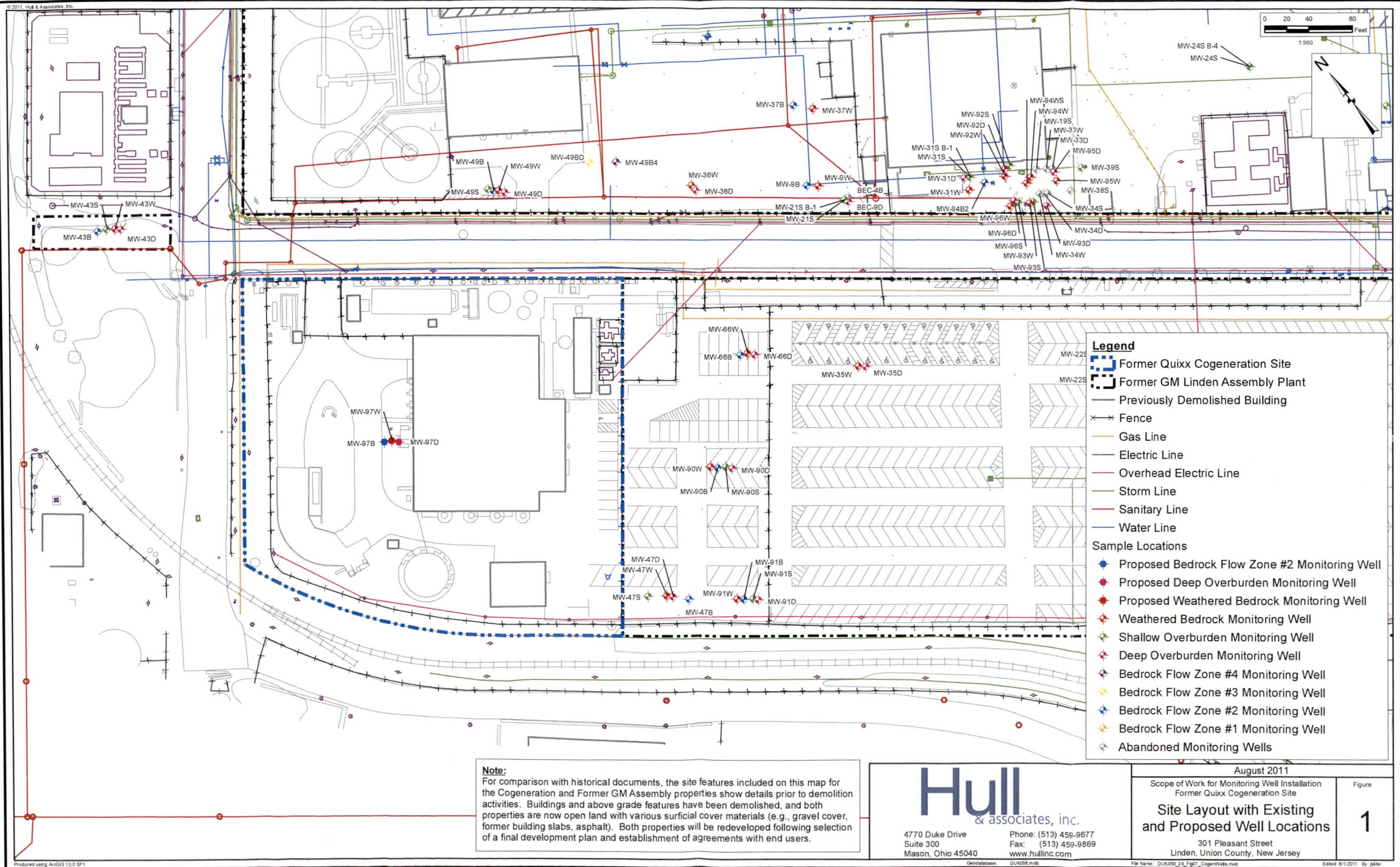
Bill Dennis
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Senior Hydrogeologist

CC: Clifford Ng (U.S. EPA)
Brian Strohl (Linden Development)

FIGURE



Note:

For comparison with historical documents, the site features included on this map for the Cogeneration and Former GM Assembly properties show details prior to demolition activities. Buildings and above grade features have been demolished, and both properties are now open land with various surficial cover materials (e.g., gravel cover, former building slabs, asphalt). Both properties will be redeveloped following selection of a final development plan and establishment of agreements with end users.

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Scope of Work for Monitoring Well Installation
Former Quixx Cogeneration Site

**Site Layout with Existing
and Proposed Well Locations**

301 Pleasant Street
Linden, Union County, New Jersey

Figure

1